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Articles:

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Sealing ability of thermoplasticized gutta-percha fill techniques as assessed by a new method of determining apical leakage

Hata, G, Kawazoe S, Toda T, Weine FS. Sealing ability of thermoplasticized gutta-percha fill techniques as assessed by a new method of determining apical leakage. J Endodon 1995; 21:167-72.

PURPOSE: To evaluate the sealing ability using a new method by comparing the adaptation between the canal wall and the gutta-percha at different levels from the apex after obturation by various thermoplasticized gutta-percha techniques.

M&M: One hundred fifty-nine single-rooted maxillary teeth were divided into 9 groups. The crowns were removed and the teeth were instrumented and then obturated with one of the following techniques: 1. Thermafil without sealer, 2. Obtura II without sealer, 3. Ultrafil regular set without sealer, 4. Ultrafil firm set without sealer, 5. Thermafil with sealer, 6. Obtura II with sealer, 7. Ultrafil regular set with sealer, 8. Ultrafil firm set with sealer, and 9. Lateral condensation with sealer. The teeth were sealed with nail polish except for the apical 2 mm and immersed in resorcinol-formaldehyde resin for 5 days. The teeth were sectioned 1, 1.5, 2.5, and 3.5 mm from the apex and leakage was assessed by evaluating the area of resin present in each section.

RESULTS: Sealer improved the sealing ability for all the techniques evaluated. There was no significant difference in the mean leakage area among the groups, but Ultrafil regular set with sealer had the best results.

C&C: This study shows similar leakage patterns for all the thermoplasticized techniques and lateral condensation.

April 1995 **Martin Gambill**

A comparison of canal preparation with nickel-titanium and stainless steel instruments

Esposito PT, Cunningham CJ. A comparison of canal preparation with nickel-titanium and stainless steel instruments. J Endodon 1995;21:173-6

PURPOSE: To compare the ability of K-Flex stainless steel files, NT hand (Mac) files, and NT rotary (nickel-titanium (Ni-Ti)) files to maintain the original root canal pathway during instrumentation.

M&M: Forty-five extracted human teeth with a canal curvature of 20-45 degrees were instrumented to a size #45 at the apex with K-Flex files, NT hand files, or NT rotary files using the Ni-Ti-Matic engine-driven handpiece. The teeth were radiographed before instrumentation (size #15), and with a size 25, 30, 35, 40, and 45 file in place. The radiographs were superimposed over each other and the amount of canal deviation was determined.

RESULTS: The nickel-titanium hand and rotary files were significantly more effective than stainless steel files in maintaining the original path of curved root canals when the apical preparation was enlarged to size 35, 40, or 45. One nickel-titanium rotary instrument separated in the canal during instrumentation. Many of the smaller (< 40) rotary files would not proceed to full working length. This was attributed to the smaller instruments' "less aggressive flute design". Even though the smaller rotary instruments would not go to working length the size 40 would proceed to working length. This was attributed to the more aggressive flute design of the larger instruments.

C&C: Nickel-titanium instruments allow larger apical preparations of curved root canals while maintaining the original canal path compared with stainless steel files. It is difficult to advocate the insertion of a larger rotary instrument to working length when a smaller instrument has failed to reach the working length.

April 1995 **Bruce Poulsen**

In vivo evaluation of root canal sealer distribution

Stamos DE, Gutmann JL, Gettleman BH. In vivo evaluation of root canal sealer distribution. J Endodon 1995; 21:177-9.

PURPOSE: To compare, in vivo, the efficacy of sealer placement using either a master gutta-percha cone or an energized ultrasonic file.

M&M: One hundred patients each received nonsurgical root canal treatment on a single tooth. All teeth were instrumented with ultrasonic files. Fifty were obturated after sealer had been placed on the master cone only, and the other fifty were obturated after sealer was placed in the canal using a #20 ultrasonic file plus coating the master cone. The presence or absence of accessory/lateral channels, as depicted by sealer extrusion on the final radiograph, was noted and recorded.

RESULTS: Significantly more teeth demonstrated accessory canals in the group in which the sealer had been placed with an ultrasonic file plus coating the master cone than the group which only had the master cone coated with sealer (12 versus 2 teeth showing accessory canals).

C&C: This study supports findings by Hoen et al. and West et al. who found that ultrasonic sealer placement covered the canals walls in a more thorough manner.

April 1995 **Martin Gambill**

Densitometric properties of rapid manual processing solutions: abbreviated versus complete rapid processing

Geist JR, Gleason MJ. Densitometric properties of rapid manual processing solutions: abbreviated versus complete rapid processing. J Endodon 1995;21:180-4.

PURPOSE: To compare differences in densitometric properties and spatial resolution between test radiographs subjected to abbreviated rapid processing (ARP) and complete rapid processing (CRP) in four rapid manual processing (RMP) solutions and radiographs processed automatically, and between ARP and CRP for each RMP system.

M&M: Kodak D and E speed films were exposed with a nine-step wedge in place. Five of each film type was processed in RMP solutions (Insta-Neg/Insta-Fix, IFP, Rapid Access, and Endo A + B). Automatic processing was established as the standard. In addition to the standard archival processing cycle, films processed in the rapid 1 min "Endo" cycle were evaluated. The optical density of every step and spatial resolution were measured.

RESULTS: Many of the films undergoing ARP had focal staining left on the films. The most extensive stains were on automatically processed films in the 1 min cycle in RP X-O-Mat. Films processed in RMP had more fog and generally lower levels of contrast. Cutting developing times in half probably has the greatest deleterious effect on film contrast. Discrepancies in fixing time are probably not as important for contrast. To guarantee sufficient clearing, fixing times should be at least twice as long as developing times. E speed film seemed to magnify the differences between ARP and CRP for some RMP systems more than D-speed film.

C&C: All RMP solutions used with complete rapid processing should produce clinically usable radiographs except Endo A + B. Abbreviated processing would lead to unacceptably poor contrast with Endo A + B and RP X-O-Mat.

April 1995 **Bruce Poulsen**

Radiographic detection of accessory/lateral canals: Use of radiovisiography and hypaque

Scarfe WC, Fana CR, Farman AG. Radiographic detection of accessory/lateral canals: Use of radiovisiography and hypaque. J Endodon 1995; 21:185-90.

PURPOSE: To investigate the use of a new Radiovisiography unit (RVG-S), with and without the use of radiopaque contrast media, in the detection of accessory/lateral canals in extracted human teeth and compare its efficacy with that of standard E-speed radiographic film.

M&M: Twenty-three molars with a total of 62 canals were instrumented to a #35 file at the apex. Teeth were mounted in a modified plaster phantom to simulate the radiodensity of bone and soft tissue and then radiographed using both conventional E-speed film at 70 kVp and by the RVG-S system. A radiopaque dye (Hypaque-M) was then flushed through the canals and the teeth were again radiographed by the 2 systems. The presence and location of accessory/lateral canals was then determined from the images. The teeth were then injected with methylene blue dye and visually inspected to confirm the presence of the accessory/lateral canals.

RESULTS: Thirteen of the roots demonstrated accessory or lateral canals upon visual inspection after dye injection (26.5%). Both conventional radiography using E-speed film and the RVG-S system had poor diagnostic sensitivity for detection of accessory/lateral canals and the differences between the two were not significantly different. The addition of the radiopaque contrast media did not significantly improve the diagnostic ability of either system.

C&C: Early detection of accessory/lateral canals continues to be elusive by radiographic means. We will just have to wait for those little surprises to appear on the final radiograph.

April 1995 **Martin Gambill**

Dentinal fluid dynamics in human teeth, in vivo

Ciucchi B, Bouillaguet S, Holz J, Pashley D. Dentinal fluid dynamics in human teeth, in vivo. J Endodon 1995;21:191-4.

PURPOSE: To estimate the pulpal tissue pressure of normal teeth through intact dentin by determining the exogenous pressure required to null dentinal fluid flow.

M&M: Five mandibular bicuspids which were scheduled for extraction for orthodontic purposes were used. The teeth were anesthetized, class V cavities were cut on the facial surfaces, the enamel and dentin were etched to remove the smear layer, and the cavity was sealed with a hollow chamber. Exogenous pressure was applied to the dentin surface until dentinal fluid flow stopped. The pulpal tissue pressure was estimated. The teeth were extracted and the remaining dentin thickness was measured.

RESULTS: All five teeth exhibited an outwardly directed fluid flow when there was no exogenous pressure. When the hydraulic conductances of each tooth was compared to remaining dentin thickness, there was no statistically significant correlation. The mean pressure measured was 14.1 cm H2O.

C&C: Pulpal pressures measured were probably near normal pulpal tissue pressures. This method may be useful in measuring pulpal tissue pressure in teeth with caries, inflammation or operative variables.

April 1995 **Bruce Poulsen**

Effect of T-cell deficiency on the formation of periapical lesions in mice: Histological comparison between periapical lesion formation in BALB/c and BALB/c nu/nu mice

Tani-Ishii N, Kuchiba K, Osada T, Watanabe Y, Umemoto T. Effect of T-cell deficiency on the formation of periapical lesions in mice: Histological comparison between periapical lesion formation in BALB/c and BALB/c nu/nu mice. J Endodon 1995; 21:195-9.

PURPOSE: To investigate the difference between the formation of periapical lesions in normal and T-cell - deficient mice by immunohistochemical technique.

M&M: Sixteen BALB/c (normal) mice and 16 BALB/c nu/nu (nude mice - congenitally T-cell - deficient) had pulp exposures made in maxillary first molars and the teeth were left open. The mice were killed at 2 week intervals and histological differences in periapical lesion development were determined histologically, and Immunologically.

RESULTS: Periapical lesions in the nude mice (lacked T-cells) were twice as large as the lesions observed in normal mice. Nude mice had circumscribed type of abscess formation versus an invasion type seen in the normal mice. T-cells do not appear to be required for periapical lesion formation, and in fact since the periapical lesion progression stopped after 6 weeks in the nude mice, it appears that T-cells are required for lesions progression.

C&C: Although not necessary for lesion formation, this study suggests that T-cells are necessary for lesion progression.

April 1995 **Martin Gambill**

Root canal morphology of human permanent teeth in a Turkish population

Çaliskan MK, Pehlivan Y, Sepetciglu F, Turkun M, Tuncer SS. Root canal morphology of human permanent teeth in a Turkish population. J Endodon 1995;21:200-7.

PURPOSE: To conduct a detailed investigation of root canal morphology of permanent teeth in a Turkish population.

M&M: One thousand four hundred extracted human permanent teeth were used. Ink was injected through an occlusal access to the apex. The teeth were cleared and the canal anatomy was evaluated.

RESULTS: Variable root canal anatomies were found in the second premolar and the mesiobuccal roots of the first and second molars among the maxillary teeth and in all of the mandibular teeth except the second premolar. Lateral canals were seen mostly in the mesial root of the mandibular second molar, mandibular first premolar, palatal root of the maxillary first molar, mesiobuccal root of the maxillary first molar, maxillary canines, and the distal root of the mandibular second molar. The apical foramina were mostly localized laterally. The mean length of the roots were shorter than that found in other studies.

C&C: The results of this investigation show similarities to the results reported by Vertucci. However, in this study, the presence of more than one canal in 22% of the maxillary lateral incisors, 55% of the mesiobuccal root of the maxillary second molars, and 30% of the distal root of the mandibular second molars contrast with Vertucci's findings.

April 1995 **Bruce Poulsen**

Application of Ca-β-Glycerophosphate for artificial apical barrier formation

Hayashi Y, Imai M. Application of Ca-β-Glycerophosphate for artificial apical barrier formation. J Endodon 1995; 21:205-7.

CASE REPORT: A 27 yr-old woman with severe pain related to a previously instrumented maxillary premolar was diagnosed with acute apical periodontitis of tooth #13. Calcium hydroxide powder mixed with saline was used for apexification since there was no apical stop. The calcium hydroxide was changed every week for 11 weeks with a gradual reduction in the patient's symptoms, but no apical barrier formation. After 11 weeks Ca-β-Glycerophosphate (Ca-BGP) powder mixed with saline was placed into the canal. One week later an apical barrier 1 mm in thickness had formed and the canal was obturated.

C&C: Ca-BGP is a source of Ca and inorganic phosphate through hydrolysis by alkaline phosphatase in blood and tissue fluid, and it is converted to hydroxyapatite when applied for direct pulp capping according to previous studies. The barrier found in this case was thought to be from the formation of hydroxyapatite.

April 1995 **Martin Gambill**

Manipulation of rubber dam septa: an aid to the meticulous isolation of splinted prostheses

Liebenberg WH. Manipulation of rubber dam septa: an aid to the meticulous isolation of splinted prostheses. J Endodon 1995;21:208-11.

PURPOSE: To introduce a method of achieving adequate isolation of splinted prostheses through manipulation of the rubber dam septa.

Technique: This technique would be good for isolating teeth which are FPD abutments or orthodontically involved. For example, if you were isolating a FPD abutment, dental tape or superfloss is passed through the hole of the anterior abutment from the buccal under the solder joint and out the lingual of the same hole. It is then threaded back through the pontic hole (the rubber dam has been included) under the solder joint and out of the buccal of the pontic hole. The two ends which are now both buccal are drawn together and tied. The rubber dam septum is fastened around the embrasure. The author also advocates clamping the posterior and anterior ends of the working field.

April 1995 **Bruce Poulsen**

The access box: An ah-ha phenomenon

Rankow HJ, Krasner PR. The access box: An ah-ha phenomenon. J Endodon 1995; 21:212-14.

DISCUSSION: Dental students have a hard time grasping a mental picture of how the final complete access should look. Students have a reluctance to remove sufficient tooth structure to obtain adequate access. The access box was constructed from a wooden box with a series of lids which gradually expose the walls of the box. As the student removes the lids more of the walls are visualized and they gain an understanding of proper access design.

C&C: Temple university must be recruiting a large number of mentally handicapped students if this is how they learn how to prepare a proper access. They probably use toy bulldozers to teach caries removal.

April 1995 **Martin Gambill**